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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/805,705

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Karen Irene Winey

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05/17/2006

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EXAMINER

HU, HENRY S

ART UNIT

PAPER NUMBER

1713

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/805,705

Applicant(s)

WINEY ET AL.

Examiner

Henry S. Hu

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on Election of March 31, 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) 46-58 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-58 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>10 pages</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This Office Action is in response to Election filed on March 31, 2006. **Applicant's election of Group I, Claims 1-45 is traversed with remarks on pages 9-10.** The traversal is on the ground(s) that it would not place an undue burden to search and examine the non-elected Group II (Claims 46-58) with the elected Group I since they are so closely related in the field of nanotube composite. This is not found persuasive because each of Group I and Group II is drawn to a technology apparently requiring search in different classification area. In the instant case Group I was drawn to a three-step process of making a nanotube composite melt, while Group II was drawn to a different subject matter as a fiber comprising polyolefin and aligned nanotubes.
2. As discussed earlier, process Groups II and I are quite different subject matters. Although same components including nanotube and polymer may be involved, a fiber with aligned nanotube in Group II is not necessarily to be made from a nanotube polymer melt of Group I. On the other way, the dispersion compound from Group I may be used as gap filler or sealant rather than being made into said fiber components other than nanotubes. In responding to Applicants' argument on pages 9-10, correct classification numbers will be given after full search; while **the dispersion compound obtained from Group I, nanotube polymer melt (after mixing), is still in the same form of dispersion.** Attention is directed to the fact that the compatibility between polymer melt and liquid (which is used to disperse nanotube in step 1)

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will determine the homogeneity. Therefore, the scope of the claims, i.e., the metes and boundaries are distinct.

The requirement is still deemed proper and is therefore made FINAL. **Claims 1-58** with **three** independent claims (Claim 1, Claim 46 and Claim 52) are pending now, while the nonelected **Claims 46-58** are withdrawn from consideration. An action follows.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. *The limitation of parent **Claim 1** in present invention relates to a process, comprising:*

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- (A) providing a nanotube dispersion comprising a plurality of nanotubes and a liquid;*
- (B) contacting said nanotube dispersion with a polymer melt; and*
- (C) mixing said nanotube dispersion with said polymer melt to provide a nanotube composite.*

*See other limitations of dependent Claims 2-45.*

5. Claims 1-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over McAllister et al. (US 5,130,342) in view of Shambaugh (US 7,001,556 B1) or Lobovsky (US 6,764,628 B2).

Regarding the process limitation of parent **Claim 1**, **McAllister et al.** have disclosed a process to prepare a **particulate-filled microporous thermoplastic polymer shaped article** which is in the form of a film, a fiber, or a tube (abstract, line 1-9). The process comprises **six continuous steps** (a) – (f) as specified on column 5, line 12-34. In a close examination, the combination of steps (a) and (b) to form a homogeneous liquid solution of fill/resin is reading on the claimed process of current application. **McAllister** further discloses that particulate particles in the submicron or low micron size can be effectively used as long as they are **capable of forming a colloidal dispersion with the compatible liquid and insoluble in the melt blend of the thermoplastic polymer and compatible liquid** (column 6, line 55 –column 7, line 20).

6. Although **McAllister** has used many types of filler in such a size, he is silent about specifically using nanotube. Each of **Shambaugh** and **Lobovsky** has individually disclosed that **nanotube as filler can be effectively dispersed in a matrix material (polymeric resin)**

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**with or without a solvent** (see “556” at abstract, line 1-11; column 3, line 8-47; column 4, line 35-41) (see “628” at abstract, line 1-3; column 3, line 1-41; column 4, line 37-41). By doing so, such a nanotube/solvent/matrix mixture can be used to form a composite material such as a draw fiber with special properties for special applications (see “556” at abstract, line 1-4; see “628” at abstract, line 1-9). It is noted that the size of nanotube is smaller than 10 microns according to the statement of “556” (column 1, line 30-34). Therefore, the size of nanotube is clearly fallen within the scope of MaAllister’s particular filler. In order to further support the use of “carbon” nanotube as filler, attention is directed to the fact that carbonaceous materials have already been used by McAllister (column 6, line 68).

7. In light of the fact that all involving references are dealing with making a mixture of fill/resin/solvent and for the same composite application, one having ordinary skill in the art would therefore have found it obvious to **modify MaAllister’s composite making process by replacing regular particular filler with nanotube** as taught by Shambaugh or Lobovsky. By doing so, one would expect all the embodiments in the same genus would succeed in making such a composite since the same size on filler is used. Additionally, more diversified composite products such as a draw fiber with special properties for special applications may be obtained.

8. Regarding **Claims 2-18**, limitations on the pressure, temperature, SWNTs, and boiling point as well as removing solvent are disclosed and/or suggested by the involved references alone or in combination throughout the specification. For instance, see step (f) for removing the solvent and/or liquid in the mixture (see “342” at column 5, line 31-34).

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Regarding **Claims 19-20**, “628” has disclosed treating nanotubes initially with the combination of water and some surfactant so as to be effectively dispersed (column 3, line 5-41; column 4, line 37-46).

Regarding **Claims 21-27**, various types of solvents can be used according to the disclosure of “342” (column 7, line 42-67). Regarding **Claims 28-29**, various types of thermoplastic polymers can be used according to the disclosure of “342” (column 7, line 1-15).

Regarding **Claims 30-32 and 36-37**, limitations on “contacting” and “mixing” are disclosed and/or suggested by the involved references alone or in combination throughout the specification. For instance, see working examples.

Remaining dependent **Claims 33-35 and 38-45** can be thereby rejected with the same reasons mentioned above.

### ***Conclusion***

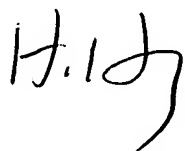
9. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The following references relate to a nanotube/resin composite: **US Patent No. 6,900,264 B2 to Kumar et al.** only discloses a composition comprises dispersed carbon nanotubes aligned with rigid-rod polymers. **It is achieved by in-situ polymerization in the**

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**presence of the carbon nanotubes**, which may be single-wall or multi-wall or combination (abstract, line 1-18). Such a process does not involve melt mixing a molten polymer with carbon nanotubes (column 3, line 8-11). Therefore, Kumar fails to teach or fairly suggest the melt process of present invention.

10. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu whose telephone number is (571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300 for all regular communications. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Henry S. Hu



Patent Examiner, Art Unit 1713, USPTO

May 12, 2006



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